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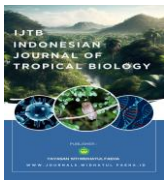

Original Research Paper

Arenga Palm Harvesting and Processing Practices by the Community of Kekait Village, West Lombok

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Abstract

This study aims to describe the traditional practice of harvesting and processing palm trees (Arenga pinnata) by the people of Kekait Village, West Lombok, as well as examining the cultural values and ethnobotanical knowledge that accompany them. The research method used is qualitative with an ethnobotanical approach, through participatory observation, in-depth interviews, and field documentation. The results of the study show that palm trees are still abundant and scattered on land owned by residents and wild land. The sap tapping technique is carried out through the stages of mantokin and bêgéyong, as well as the use of traditional tools such as bamboo, belakas, and laru wood as natural bioinhibitors. The process of processing sap into ant sugar is carried out without chemicals, reflecting local wisdom in maintaining the quality and sustainability of the environment. It was also found that human behavior and emotions can affect crop yields, which suggests an ecological-spiritual relationship between humans and trees. These findings confirm the importance of preserving local knowledge as part of biocultural conservation and sustainable management of natural resources.

Keywords: Arenga pinnata, Etnobotani, Konservasi, Biokultural

INTRODUCTION

The sugar palm (*Arenga pinnata Merr.*) is a tropical palm species widely distributed in Southeast Asia, such as Indonesia (Haryoso et al., 2020). This plant plays an important role in traditional agroforestry systems because it can grow on marginal land, is drought-resistant, and helps maintain soil stability and biodiversity (Fahad et al., 2022). Aren is also known as a multifunctional plant, with almost all parts of it being usable, from the sap, fruit, fiber, stem, to the leaves (Imraan et al., 2023). Its ecological and economic value makes this plant relevant for study in the context of conservation biology and sustainable use of biological resources (Favi et al., 2022).

The utilization of *Arenga pinnata* is a versatile plant whose almost entire parts can be processed into economically valuable products (Iskandar & Iskandar, 2021). The sap produced from male flower clusters can be fermented into alcohol or reduced into palm sugar (Gunawan et al., 2020), while other parts such as fiber, stem, leaves, and fruit can be used as building materials, crafts, animal feed, and compost (Kurniawan et al., 2018). The harvesting and processing of these crops are generally done traditionally by rural communities and are part of the local knowledge system passed down thru generations (R. Gunawan et al., 2017).

One of the areas that still maintains this traditional practice is Kekait Village, Gunung Sari Distict, West Lombok Regency (Haq & Hamdi, 2016). In this village, the community harvests areca palm sap using specific techniques adapted to local ecological conditions (Adawiyah et al., 2025). The process of processing sugarcane juice into the final product, such as palm sugar, is done manually, without the addition of chemicals (Lagacé et al., 2019). Although this practice is traditional, it has high adaptive and ecological value (Altieri & Nicholls, 2017). However, there are still few scientific studies that document and analyse this practice in depth, especially from the perspectives of plant biology and resource sustainability.

Most research on *Arenga pinnata* still focuses on agronomic aspects, chemical content, and commercial utilization, while the socio-ecological dimensions of local management practices still receive insufficient attention (Mpanda et al., 2014). In fact, harvesting practices that do not consider plant ecophysiology have the potential to reduce the natural regeneration rate, long term productivity, and sustainability of *Arenga* populations in their natural habitat (Husain et al., 2025). Therefore, an interdisciplinary study is needed that integrates ethnobotanical, plant ecological, and community-based resource management approaches (Rist & Dahdouh-Guebas, 2006).

This research aims to fill this gap by describing and analysing the harvesting and processing practices of *Arenga* palm products by the people of Kekait Village. The study focuses on harvesting techniques, production cycles, and sap processing, as well as their impact on the ecological and social sustainability of the *Arenga pinnata* population. By

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understanding local practices from a scientific perspective, the results of this study are expected to serve as a foundation for developing species conservation strategies, strengthening local resource-based economies, and preserving traditional knowledge in line with the principles of environmental sustainability.

RESEARCH METHODS

Time and Location of Research

This research was conducted from January to April 2025 in Kekait Village, Gunungsari District, West Lombok Regency, West Nusa Tenggara Province. This location was chosen because the community still maintains traditional practices in harvesting and processing the sugar palm tree (*Arenga pinnata)*

The majority of the population works as farmers, artisans, and daily agricultural laborers. Generally speaking, the socio-economic conditions of the people in this village are still considered middle to lower class. Access to formal education and healthcare services is quite adequate, but it is not yet fully equitable. Many families rely on income from traditional agriculture and non-timber forest products, including the sugar palm (*Arenga pinnata*), as their primary or supplementary source of livelihood.

Arenga palm commodities have significant economic value because their products, such as palm sugar and tuak, are a daily source of income for most households. This activity is often family-run, with typical gender roles: men are responsible for tapping the sap, while women are involved in processing the sap into finished products. This practice demonstrates a strong connection between economic, social, and cultural aspects. Additionally, the Kekait community still maintains local wisdom and traditional knowledge in natural resource management, even tho they also face challenges such as limited market access, price fluctuations, and pressure on sustainability.

Research Design

This study uses a descriptive qualitative approach with ethnographic methods to explore the meaning, processes, and social practices in the utilization of the sugar palm tree (Wahyudiati & Fitriani, 2021). The research focus is directed toward harvesting practices, processing, and the cultural values inherent in these activities.

Research Population and Sample

The population in this study is the entire community of Kekait Village involved in the utilization of the sugar palm tree. The research sample consisted of 15 key informants selected purposively, including arenga palm farmers, arenga sugar artisans, and traditional leaders. The sampling technique used purposive sampling with the criteria of direct involvement in arenga palm production activities and in-depth local knowledge (Noy, 2008). The main research variables are harvesting techniques, processing systems, and cultural values (Blancas et al., 2013). Data was obtained thru participant observation, in depth intervies, and literature studies, with the aid of observation guides, interview guides, and documentation (Rutakumwa et al., 2020).

Research Procedure

The research process began with a literature review to understand the theoretical framework and previous findings related to the utilization of *Arenga pinnata* (Luft et al., 2022). Next, participatory observation was conducted in the field, where the researcher participated in community activities such as tapping and processing sap. In-depth interviews were conducted with key informants to explore local knowledge, traditional techniques, and community perceptions (Rahman & Alam, 2016). All data is recorded in the form of narratives, field notes, and visual documentation. Data validation is performed thru triangulation of methods and sources (Santos et al., 2020).

Data Analysis

Data analysis was conducted based on the approach of Miles and Huberman (1994), which includes three stages: (1) data reduction by selecting relevant information from observation and interview results, (2) data presentation in the form of descriptive narratives and thematic tables, and (3) drawing conclusions thru inductive interpretation of patterns and meanings from field findings. Verification is done simultaneously with the analysis process thru discussion of findings and rechecking with informants.

RESULTS AND DISCUSSION

In Kekait Village, West Lombok Regency, the harvesting of arenga palm is done traditionally by the community, especially by farmers who have inherited knowledge from previous generations. Harvesting begins by selecting arenga palm trees that have reached their productive age, usually over 10 years old. This process is generally carried out daily and individually, although in some cases it is assisted by family members.

The population of sugar palm trees in Kekait Village is considered quite abundant and is found naturally or semi-cultivated on residents' land, riverbanks, hillsides, and home gardens. Nipa palm vegetation generally grows alongside other tropical plant species such as coconut, banana, and bamboo (Sains et al., 2024). The presence of the arenga palm tree not only has economic value but also ecological value, as it contributes to soil and water conservation and provides habitat for local fauna (Martini et al., 2012). Nevertheless, pressure on natural regeneration began to emerge due to the intensification of harvesting without systematic replanting, necessitating community-based conservation efforts to ensure the sustainability of the arenga palm population in the region.

Traditional techiniques for Harvesting Arenga Palm Trees

Palm sugar farmers in Kekait Village follow a series of traditional steps in the process of tapping sap from the flower cluster (peji), which have been passed down thru generations, as explained by Febriyanti et al., (2017); Haryoso et al., (2020). The first stage of sap processing begins immediately after the characteristic aroma of the arenga flower appears. This aroma is known to the local community as "mambu angin" or "bou angin," which indicates that the flower has

begun to emit the characteristic sweet smell of arenga sugar. Farmers recognize this aroma as a natural signal that the flowers are beginning to bloom and are ready to be tapped. This process is called the biological maturation phase (Sarkar et al., 2023).

The second stage, after detecting the aroma, is for the farmer to ensure that some of the flowers have opened. Then, several preparations were made, including traditional bamboo ladders (*sanggéng*) or *tréng* poles (*Gigantochloa atter*), which were used to climb the areca palm trees (*njuk*). This process is accompanied by cleaning the flower bunches of their petals (*seludang*) and tying the bunches to the tree above them (Cowen, 1952). Binding is important because the weight of the bunch increases daily; if it breaks, the bunch can no longer produce sap when cut (pêsuk). This stage of cleaning the fronds and leaflets is called ngélah (Figure 1.A).

In the third and fourth stages, 2–3 days after *mambu angin* is detected, farmers begin to gently tap (*mantokin*) and shake the flower bunches (*bêgéyong*) to stimulate the flow of sap (Figure 1.B–C). Based on observations, farmers beat the flower bunches for approximately 10 minutes with a total of nearly 200 strikes. They also shake the flower bunches approximately 40 times in one sequence (1 bucket). This is an important step because sap tends to spoil quickly and result in poor-quality palm sugar (Kurniawan et al., 2018).

Figure 1. Traditional harvesting (Haryoso et al., (2020)
***Description**; A. Installation of bamboo stairs, cleaning of fiber, B. Beating flowers clusters, C. Shaking flower clusters, D. Flower cutting, E. Installation and F. Container replacement

Next, based on the experience of areca palm farmers who have been harvesting for decades, the number of times they beat and shake the flower clusters or bouquets depends on the flower clusters being tapped. Generally, the first arenga flower (punique) yields more buckets than the second or subsequent arenga flowers. The first arenga flower is 6 buckets old (50 days), while the second and subsequent arenga flowers are less, only 4 buckets (34 days). Fourth process. After completing the 3 stages of tapping preparation, the farmer will cut the arenga flower cluster using a special machete. The parang has a sharp edge and a very thin blade resembling the letter "S", commonly called a sadep. The farmers will cut the arenga palm flowers right at the top of the flower spike (Figure 1)

Ethnobotanical knowledge and the cultural significance of ant sugar making

The utilization of the arenga palm (Arenga pinnata) by the people of Kekait Village demonstrates the integration of rich ethnobotanical knowledge and local cultural values (Permata et al., 2024). The initial process begins with the traditional technique of tapping sap. In the fifth stage, farmers will collect the sap and replace the nira water collection containers twice a day, specifically in the morning around 6:00–7:00 WITA and in the afternoon between 15:00–16:00 WITA (Figure 1.E–F). During the 3 to 4 month tapping period, farmers must maintain their personal behavior and hygiene. They are prohibited from doing things considered unethical, including domestic disputes. Local belief states that the areca palm tree can "sense" the emotional state of the tapper; if the tapper is angry or stressed, the tree may stop producing sap.

The male flower clusters are gently tapped for several days to stimulate the sap to flow, and then the tips are cut off little by little. The sap that comes out is collected using traditional tools like bamboo roofs. This technique not only reflects the utilization of specific parts of the tree and local materials as aids but also embodies a philosophy of care, patience, and respect for the tree as a source of life (Abbott, 2021). This knowledge is passed down thru generations and has become an integral part of the local community's agroforestry practices. The ethnobotanical and cultural knowledge of the community is presented in its entirety in Table 1. After being tapped, fresh sap is processed into various products, one of which is ant sugar. Ant sugar is the result of crystallizing sap using traditional techniques without the addition of chemicals.

This process is carried out by gradual heating, continuous stirring, and filtration to produce fine granules. This product has high economic value and increasing market demand because it is more practical and durable than conventional molded sugar (Singhal et al., 2008). From a cultural perspective, the production of ant sugar reflects the value of mutual cooperation within the family, as the involvement of family members is crucial at every stage of its production (Royyani et al., 2025). This also demonstrates the sustainable and efficient utilization of local resources.

To maintain the quality of the sap before processing, the people of Kekait use laru or kawao wood, which acts as an early fermentation inhibitor. This wood is placed in the juice collection container to prevent spoilage caused by microorganisms. The use of local plants as natural bioinhibitors is a form of ecological knowledge developed based on empirical experience. This practice not only plays a technical role but also reflects local wisdom in maintaining the quality of agricultural yields while demonstrating the community's understanding of their environmental potential (Roht-Arriaza & Roht, 1996).

Without chemicals, communities are able to maintain the quality of sap thru an environmentally friendly approach based on local availability. Beside the technical aspects, the activities of tapping and processing sap also reveal a distinct gender-based division of labor (Permata et al., 2024). Men generally tap sap, cook fresh sap, and perform initial distribution.

Table 1. Ethnobotanical Knowledge and Cultural Significance of the Kekait Village Community, West Lombok Regency

No	Theme	Findings	Ethnobotanical knowledge	Cultural significance
1	Tapping Tehcnique	The male flower clusters are lightly tapped and the tips are trimmed slightly, then bamboo is instaleed to collect the sap ant sugar.	Utilization of the male flower parts of the *Arenga pinnata* tree and bamboo as traditional tools for collecting sap	It contains the philosophy of caution, patience, and respect for trees as a source of life
2	Processing form	Ant sugar	Processing sap into crystals using traditional techniques without chemicals	The product has economic value and symbolizes mutual cooperation within the household
3	Local cultural values and knowlegde	Laru wood or kawao as an inhibitor of early fermentation in palm sap	Utilization of local plants as natural bioinhibitors	Demonstrates local wisdom in maintaining the quality of agricultural products and the ecological utilizaiton of natural resources
4	Gender roles	Men: tapping sap, initial processing (cooking sap) and distribution. Women: further processing into products, packaging, and marketing.	Division of labor based on inherited experience and physical capacity.	This reflects a balance between gender roles and the family's collective work system in economic activities.
5	Economic and market constraints	Market access, business capital, and knowledge and technology	Lack of innovation based on local resources in product processing and marketing	Modernization challenges to the sustainability of traditional practices; the need for support for the preservation of local culture

Meanwhile, women play a role in downstream processing such as packaging and marketing the product. This division of labor is based on inherited experience and the physical capacity of each party. This structure reflects the balance of roles in the farming household and underscores the importance of collective work in the rural family economic system. This work model strengthens social solidarity and supports the sustainable continuation of arenga palm processing practices. However, the people of Kekait Village still face various obstacles in developing businesses based on arenga palm sap products

Some of the common challenges include limited access to markets, business capital, and technological knowledge. The lack of innovation based on local resources in product processing and marketing also affects the competitiveness of processed arenga products in the wider market. Modernization and globalization demand adaptation without losing the traditional essence that has been the main strength. Therefore, efforts to preserve local culture must be accompanied by training support, access to capital, and strengthening economic institutions so that these traditional practices rich in cultural value remain sustainable and able to meet the challenges of the times.

Challenges in Ant Sugar Production

Although ant sugar production has developed in Kekait Village, the processing still faces several challenges. One of the main constraints is the limited production tools, especially for households that still use traditional equipment. Reliance on manual equipment makes the production process slower, less efficient, and the results are often inconsistent. Additionally, the lack of access to modern technology and training in processing techniques also poses an obstacle to increasing production scale and product quality.

Previous literature, as stated by Syarif et al. (2020), indicates that processing areca nut has high ecological and economic value, particularly in the context of the sustainable livelihoods of local communities. These findings were then deepened thru interviews with areca farmers and processors in Kekait Village, which provided direct insights into their local knowledge, daily practices, and the challenges they face, such as climate change or market access. Another issue relates to the availability of quality sap, which is highly influenced by the season, weather, and tapping techniques. During the rainy season, the volume of sap produced tends to decrease and ferment more quickly, making it unsuitable for making ant sugar. Additionally, some farmers still haven't implemented adequate hygiene standards in both tapping and post-harvest handling, which ultimately affects the product's competitiveness in the wider market.

Ecological and Social Sustainability

In Kekait Village, West Lombok Regency, the harvesting and processing of arenga palm (Arenga pinnata) is done traditionally based on local knowledge passed down thru generations. The population of areca trees in this region is distributed naturally and thru semi-cultivation, growing in residents' yards, along riverbanks, and on hillsides, and coexisting with other tropical vegetation such as coconut, banana, and bamboo. The presence of areca trees contributes significantly to soil and water conservation, as well as providing habitat for various local fauna (Martini et al., 2012).

However, ecological sustainability is beginning to be threatened by intensive tapping practices that are not balanced by systematic replanting efforts. This impacts the natural regeneration of sugar palm trees, which is becoming increasingly hindered. Therefore, a community-based

conservation approach is urgently needed to ensure the sustainability of the arenga palm population in this region. The traditional tapping techniques used by the Kekait community tend to be environmentally friendly. The process begins when the male flowers emit a distinctive aroma (wind smell), followed by beating and shaking the bunches to stimulate the release of sap. After being tapped, the sap is collected in bamboo containers and processed without chemicals. The use of laru wood (kawao) as a natural bioinhibitor to prevent premature fermentation is also a form of local wisdom that prioritizes ecosystem sustainability. These practices demonstrate the close relationship between society and the surrounding natural environment, where nature is respected as a life partner, not merely an economic resource.

CONCLUSION

1. The practices of harvesting and processing arenga palm (Arenga pinnata) in Kekait Village reflect the integration of ethnobotanical knowledge, local cultural values, and ecological sustainability principles. The process of tapping sap is done traditionally based on inherited knowledge, with steps that reflect care and respect for the tree as a source of life. Farmers utilize parts of the male flower and tools made from local materials like bamboo, and use laru wood as a natural bioinhibitor, which confirms local wisdom in maintaining the quality of agricultural products.
2. The presence of the sugar palm tree has significant ecological value, such as maintaining soil and water conservation and providing habitat for fauna. However, tree regeneration is threatened by intensified harvesting without planned replanting. Additionally, challenges such as limited market access, modern equipment, and technical training hinder the development of nira-based businesses.
3. Despite this, the practice has persisted thanks to the family's collective work system and gender-based division of roles. Therefore, the sustainability of arenga palm processing practices requires participatory conservation support, local technology-based innovation, and the preservation of cultural values, so that communities can maintain their identity while sustainably improving their well-being.

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